

<b>Priority 15: Develop and implement invasive species management plans utilizing techniques that are supported by best available science to enhance habitat and increase the survival of native species</b>
<b>Species Information</b>
What invasive species are you targeting?
<p>Invasive plant species: Invasive species management may include management of non-native plant species. A total of 129 non-native plant species were identified within the project study area; a comprehensive list of plant species identified in the project study area is included in the table: <i>Centennial Reservoir Project: Plant Species Observed On-Site</i> (See Table 1) Non-native species observed are indicated by asterisk (*). Invasive species targeted for this grant include: wild oats (<i>Avena fatua</i>) and soft brome (<i>Bromus hordeaceus</i>) found in 49.7 acres of California Annual and Perennial Grassland habitat within the project study area and ripgut brome (<i>Bromus diandrus</i>), meusahead grass (<i>Elymus caput-medusae</i>), and yellow star-thistle (<i>Centaurea solstitais</i>) found in 11.3 total acres of Mediterranean California Naturalized Annual and Perennial Grassland habitat within the project study area. An Invasive Plant Species Management Plan would be developed for the project, in consultation with the resource agencies, to control the further spread of non-native invasive plants during project implementation.</p> <p>Invasive wildlife species: Invasive species management would include management and/or removal of non-native wildlife species such as bullfrogs that are known predators of native fauna such as foothill yellow-legged frog.</p>
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the biology of the invasive species and their impacts on native fish and wildlife are described and quantified.
<b>Table 1: Centennial Reservoir Project: Plant Species Observed On-Site.</b>
<b>REV 2: Magnitude of ecosystem improvements</b>
<p>When implemented what is the expected magnitude of habitat enhancement and increased survival of native species? Magnitude should be expressed as: a) the change from current conditions without the project to current conditions with the project, and b) the change from 2030 conditions without the project to 2030 conditions with the project. How did you estimate this value?</p> <p>If the project intends to target multiple invasive species, the magnitude of the ecosystem improvement for each species needs to be provided.</p> <p>The proposed inundation of approximately 1,300 acres is anticipated to reduce targeted invasive plant species and other non-native plants observed during botanical field surveys of the Project Study Area (as listed in Table 1). Reservoir creation is also anticipated to present a formidable obstacle to the disbursement of populations of invasive species found to the north and south of the proposed reservoir.</p> <p>In addition, reservoir development is anticipated to create conditions adjacent to and within the inundation area that allow for establishment of native riparian and wetland habitats, including perennial and seasonal wetlands (i.e., perennial marsh, seasonal marsh, and seasonal wetlands). Establishment of native riparian and wetlands areas would benefit native wildlife that utilize such habitat types including nesting songbirds and small mammals such as bobcat, ringtail cat, and mink.</p> <p>At this time, quantification of the magnitude of the habitat enhancement and increased survival of native species as a result project implementation has not occurred. This would occur upon development of adaptive management and monitoring programs to address invasive and native species.</p> <p>Under current and 2030 conditions without the project, invasive species would remain in place and the survival rate for native species would also remain.</p>
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the magnitude of the ecosystem improvement is described and quantified.
<b>Figure 1: Location of Ecological Benefits included with Priority Form #14.</b>
<b>REV 3: Spatial and temporal scale of ecosystem improvements.</b>
What is the geographical extent (e.g. river miles, acres) of the ecosystem improvement that will address this priority?
The proposed reservoir at maximum pool would inundate approximately 1,300 acres.
Additional locations in the application, supporting documentation or attachments (document name, page number, figure name)

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or number, other) where the geographical extent of the ecosystem improvement is documented or mapped.
When during the year will the project manage invasive species for the benefit of native species? How is the distribution of invasive species likely to vary with hydrologic conditions (i.e. among water year types) a) under current conditions with and without the project, and b) in 2030 with and without the project? If the project intends to target multiple invasive species, provide the timing of management actions for each invasive species separately.
As illustrated in the Eligibility and General Project Information Tab, A.3 Project Description, the proposed project would create a new reservoir along the Bear River with a storage capacity of 110,000 acre-feet and a maximum inundation area of approximately 1,300 acres. The reservoir would be operated as a "fill-and-spill" project, with a prioritization of maximizing reservoir storage during the winter and early spring runoff period. During the water delivery period (late spring through early fall), Centennial Reservoir would be used in coordination with NID's existing reservoir network to provide water to customers in NID's lower Bear River watershed service area. During the majority of years and as hydrologic conditions allow, Centennial Reservoir would be operated at or near its full gross storage (110,000 acre-feet) throughout the year, with any seasonal drawdowns due to minimum instream flow requirements and evaporative losses. In the fall and early winter, Centennial Reservoir would store any watershed runoff (in excess of minimum instream flow requirements) in order to return the reservoir to full pool. Clearing of terrestrial invasive species is anticipated to occur during proposed project construction. Management of invasive species would occur through implementation of adaptive management and monitoring programs developed in coordination with the resource agencies. However, the high frequency and extended duration of maintaining the reservoir at maximum pool would likely restrict the establishment of targeted and other non-native plant species within the area of inundation.  Without the project, invasive species management would not occur now or in the future since there is no plan for invasive species management is proposed in the project area.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the timing of ecosystem improvements that address this priority are described and quantified.
<b>REV 4: Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds, and triggers to achieve ecosystem benefits.</b>
Provide additional information on how this ecosystem improvement will be incorporated into the adaptive management and monitoring program. If available, provide examples of objectives, performance measures, thresholds, or triggers that could be used to manage benefits associated with this priority.
The Federal and State permitting processes preceding CEQA and NEPA certification and final project approval will be extensive and include provisions for invasive species management and benefits to native plant and wildlife species. NID would coordinate with USFWS, California DFW, and other entities to prepare adaptive management and monitoring programs to address invasive and native species concerns. Given that the proposed project is in the early stages of planning and environmental review, such programs have yet to be developed.
<b>REV 5: Immediacy of ecosystem improvement actions and realization of benefits</b>
Immediacy of ecosystem improvement: Number of months from grant encumbrance until the proposed ecosystem improvement is completed (i.e. the expected timeframe until the improvement is implemented or construction is completed).
An invasive species management plan would be developed in consultation with the resource agencies, and the approved plan would include timeframes for implementation.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the immediacy timeframe is described and quantified.
Refer to the Eligibility and General Project Information Tab, A.3 Project Description.
Realization of ecosystem improvement: Number of months from the time the ecosystem improvement is completed (i.e. project is implemented or construction is complete), until the benefit associated with this priority can be observed (i.e. when measurable improvements can be observed and quantified)
An invasive species management plan would be developed in consultation with the resource agencies, and the approved plan

would include timeframes for implementation.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the realization timeframe is described and quantified.
<b>REV 6: Duration of ecosystem improvements</b>
How long (number of years) after realization (as calculated under REV 5 above) is the ecosystem improvement expected to address this priority? Maximum is 100 years. Explain how this value was determined and whether the magnitude of the ecosystem improvement is anticipated to change over time.
100 years. Reservoir operations under the proposed project are envisioned to continue for the foreseeable future. With operation of the reservoir, the benefits of the proposed project for the purpose of control of invasive species would be maintained per the invasive species plan to be developed in consultation with the resource agencies.
Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the duration of the ecosystem improvement is described and quantified.
<b>REV 7: Consistency with species recovery plans and strategies, initiatives, and conservation plans</b>
Does the ecosystem improvement meet any goals or objectives established in existing species recovery plans, initiatives, or conservation plans including but not limited to the NOAA Fisheries Recovery Plan for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead; State Wildlife Action Plan; Central Valley Joint Venture Implementation Plan, San Joaquin County Multi-Species Habitat Conservation Plan and Open Space Plan, Draft Solano Multi-Species Habitat Conservation Plan, East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, Draft Recovery Plan for the Giant Garter Snake, and California Water Action Plan? If so which goals, objectives, or actions will be met? Why?
The 2014 California Water Action Plan was developed to meet three broad objectives: <i>“more reliable water supplies, the restoration of important species and habitat, and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades.”</i> A critical element in achieving these objectives is the creation of additional surface storage. As stated in the plan, <i>“The bottom line is that we need to expand our state’s storage capacity, whether surface or groundwater, whether big or small. Today, we need more storage to deal with the effects of drought and climate change on water supplies for both human and ecosystem needs.”</i> Opportunities for the development of a major on-stream surface storage project in California are limited as evidenced by the fact that it has been 40 years since the last such project was completed. Centennial reservoir presents an ideal opportunity for developing new significant surface storage. The proposed project is located on a highly regulated reach of the Bear River located between two existing reservoirs (Combie and Rollins) located immediately downstream and upstream, respectively, of the project site. With the anticipated minimization of invasive plant species within the area of inundation and the likely obstacle to dispersal of species the future reservoir would present, the proposed project would help facilitate the objectives of the CDFW Invasive Species Program in relation to plants.
Additional locations in the application, supporting documentation or attachments (page number, table number, other) where the consistency with goals, objectives, or actions from recovery plans, initiative, or conservation plans are discussed.
<b>REV 8: Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values</b>
Provide a map that shows the extent of the ecosystem improvement that will address this priority (e.g. river miles that meet the temperature benefits). Provide additional instructions or clarification to reviewers who will be viewing this map (i.e. describe the color and/or label that identifies the spatial extent of the ecosystem improvement). If available, also submit supporting electronic files such as a .kmz file or ArcGIS layer associated with the maps provided.
Refer to the attached figures: <b>Figure 2a: Vegetation Alliances and Land Cover Types - North, and Figure 2b: Vegetation Alliances and Land Cover Types – South.</b> These figures show vegetation and cover types identified that contain invasive plants located within areas to be inundated by the proposed reservoir at maximum pool, as described in the first box above.
Explain why the location of invasive species management was selected. How is the location beneficial to the survival of native species in the context of local environmental conditions and species' needs?
As described above, the location being evaluated for Centennial Reservoir would effectively work in conjunction with NID’s existing Rollins Reservoir to expand the total storage capability in the Bear River watershed. This use would allow additional

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<p>water to be captured from natural runoff in the Bear River watershed (both the runoff in excess of what Rollins Reservoir can store on a seasonal basis as well as the runoff in the sub-basin below the Rollins catchment) for the purpose of maximizing reservoir storage during the winter and early spring runoff period to provide water to customers in NID's lower Bear River watershed service area. Although, invasive species management is inherent to project implementation it is not the primary factor in siting the proposed project.</p>
<p>Is the ecosystem improvement location adjacent to, or near, other areas already being protected or managed for conservation values? Explain the proximity of the ecosystem improvement to other areas already being protected or managed for conservation values and any hydrologic connectivity that may occur between these locations.</p>
<p>The proposed project is not located near other areas currently being managed for invasive plant species control. Additionally, no programs for the control of aquatic animal species are currently in effect at Rollins Reservoir upstream of the project site or at Combie Reservoir, downstream of the project. It should be noted however, that NID, in partnership with the California Division of Boating and Waterways (CDBW) and CDFW, is developing an Aquatic Invasive Species Program. The program would focus on Quagga and Zebra Mussels, which pose a serious threat to state waters and fisheries and the spread of these mussels threatens aquatic ecosystems, water delivery systems, hydroelectric facilities, agriculture, and recreation. In 2017 the program would include water chemistry monitoring, visual surveys, boat inspections, and the development of a Quagga and Zebra Mussel Prevention and Monitoring Plan. It is assumed that once the Aquatic Invasive Species Program is developed it would be implemented at the proposed project site as well as at Rollins and Combie reservoirs.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, table number, other) where the timing of ecosystem improvements that address this priority are described and quantified.</p>
<p><b>REV 9: Efficient use of water to achieve multiple ecosystem benefits</b></p>
<p>If applicable, how will water be efficiently managed to implement invasive species management?</p>
<p>Refer to REV 3, above.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe the design efficiencies and operational strategies used to maximize water efficiency under this priority.</p>
<p><b>REV 10: Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change.</b></p>
<p>Which environmental uncertainties associated with this priority were considered in the project siting, design, and operation? How were these uncertainties incorporated into project siting, design, or operation? Examples of environmental uncertainties include, but are not limited to: sea level rise, temperature changes, changes in precipitation, landslides, erosion, earthquakes, wildfires, drought events, and flooding events.</p>
<p>As noted under REV 7 above, the proposed project would help meet the statewide need for more surface water storage to help address the uncertainties of future drought and climate change and their effects on water supplies for both human and ecosystem needs. Centennial Reservoir presents an ideal opportunity for developing new significant surface storage.</p> <p>Also as stated above under REV 7 and 8, the area being evaluated for the proposed project is considered a suitable location along the Bear River since it would be located on an already regulated reach of the Bear River between two existing reservoirs. The ecosystem improvements related to invasive species control would result from implementing the invasive species management plan that would be developed in consultation with the resource agencies for implementation during and after development of the Proposed Project.</p>
<p>Additional locations in the application, supporting documentation or attachments (document name, page number, figure name or number, other) that describe and quantify the environmental uncertainties considered in the project siting, design, and operation.</p>